

PHYS 3343
Thermal Physics
Spring 2001
Class Location: LSC 110
Class Time: 10:00 - 10:50 MWF
Dr. Stephen R. Addison

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TEXT: *Thermal Physics*, 1999, Ralph Baierlein

Over the years, I have used many different textbooks for this course, you can find out which ones by consulting the course home page. While this is the main book that I will use, I will use many others you can see a list of books that I like on the course home page. While our text is a good one, you will find it useful to become familiar with books at higher and lower levels. Remember your goal is to master thermal physics, not the contents of any particular book.

CATALOG DESCRIPTION:

The fundamental principles of thermodynamics and statistical physics. Lecture.
Prerequisites: PHYS 2443 or 2430, MATH 3321. Spring, odd years.

COURSE GOALS:

This course is designed to develop a fundamental understanding of thermal systems in both macroscopic and microscopic terms. The course is also designed to develop skills in the methods of theoretical physics. The coverage is designed to be the only course in this discipline that you will ever need.

Topics to be covered include:

- The laws of thermodynamics
- Entropy
- Thermodynamic processes and variables
- An introduction to probability and information theory
- The microcanonical ensemble
- The canonical ensemble
- The ideal gas
- Photons and phonons
- The chemical potential
- Thermodynamic potentials
- The Grand Canonical Ensemble
- The ideal quantum gas
- Phase equilibria and critical phenomena

Kinetic Theory
Low temperature physics
Stellar thermodynamics

WEB PAGE:

I have established a web page for the course. You should check it frequently. It will contain information that will aid your studies in this course. In addition all assignments and their solutions will be posted on the web page. Assignments will also be announced in class. Solutions will ordinarily be distributed only through the web site.

EXPECTATIONS:

Students are expected to:

- Attend all classes.
- Complete all assignments.
- Take exams and turn in assignments as scheduled.
- Ask me about my material they don't understand.
- Actively participate in the class.

ATTENDANCE POLICY:

I expect you to attend all classes. If you know that you will be missing a class, you should discuss it with me before a class is missed. If you miss a class without prior arrangement you are required to provide me with a written explanation. Students who are excessively absent will be dropped for non-attendance. A written warning will be provided to any student who is in danger of being dropped for non-attendance.

PUNCTUALITY:

I will be on time for class, and will be ready to start at 10:00 and I will finish promptly at 10:50 every day. Lateness and/or early departures will not be tolerated.

OFFICE HOURS:

I am usually in my office from 8:00 to 4:45. You can see me if I am available. If I am not available, my secretary will make an appointment for you. You can also call my secretary at 450-5083 to schedule an appointment.

GRADING SYSTEM:

Grades will be determined by the following:

- Three or four 100-point tests
- A 200-point, comprehensive final
- Approximately 100 homework problems worth 1 to 10 points each
- A semester long project worth 100 points

Tests will include problems, derivations of key equations, numerical computations and short essays. Homework problems will be numbered sequentially throughout the course. Assignments will explicitly state the point value of each problem. Problems will be taken from our text, and from a variety of other sources. Assignments will involve analytical and numerical solutions, and written assignments. Assignments that involve computers can be performed using any common language. I will make arrangements for you to have access to computers containing F and Python. Some assignments requiring computation could be performed on a TI-92 calculator. However, if you have relied on a TI-92 to do calculus, you are going to find that it will frequently fail on the functional manipulations that we will be learning.

The points earned throughout the course will be converted to a percentage. Grades earned will be determined by the following scale:

A	90 +
B	80-89
C	70-79
D	60-69
F	0-59

SEMESTER PROJECT:

You will each develop a project that will expand on the material of the course. This project can be theoretical or experimental. All students will work on different projects. Your choice of project must be approved. I will be posting suggestions on the course web page; however, your project can be on any subject related to thermal physics. Point values, and due dates are provided below. The Physics Teacher and the American Journal of Physics are good sources of suitable projects. Your final goal is to produce a report of approximately 10 pages in length. The report must be produced on a computer and should use the style of the American Journal of Physics.

Prospectus (one page) with references (at least 5 required, copies of the first page of each must be attached to the prospectus). **(10 points - Due January 31)**

Progress Report 1: **(10 points – Due February 28)**

Progress Report 2: **(10 points – Due March 28)**

Oral Presentation: **(20 points - May be given any time after the progress Report 2)**

Written Report: **(50 points – Due by April 30)**

Additional details about the nature of these assignments and some options will be discussed throughout January.

ACADEMIC INTEGRITY:

Plagiarism, copying from others on tests, the use of unauthorized materials on tests (cheat sheets, programmed calculators, etc.), or any other form of academic misconduct will not be tolerated. Penalties for academic misconduct are described in the UCA Student Handbook. Penalties can include grade reduction on an assignment or in a course and can extend to expulsion from UCA. Further details about these procedures are described in the UCA Student Handbook.

All that having been said, science is an essentially collaborative endeavor so you are encouraged to collaborate and to seek help from other **students** to do complete your assignments, but the final write-up should be your own. If you do obtain help, you should acknowledge it. Such an acknowledgement will not lower your grade. Tests, either in class, or take home, must be entirely your own work

AMERICANS WITH DISABILITIES:

The University of Central Arkansas adheres to the requirements of the Americans with Disabilities Act. If you need an accommodation under this Act due to a disability, contact the UCA Office of Disability Services at 450-3135. In addition, I ask that you confer with me so that we can make appropriate arrangements for any required accommodation.

GENERAL POLICIES IN THE STUDENT HANDBOOK:

Students are expected to be familiar with the general policies of the university. I encourage you to read the UCA Student Handbook where these policies are described. For your convenience, I provide some page references.

- Academic Policies (beginning on page 26 of the 2000-2001 Student Handbook)
- Sexual Harassment Policy (page 93 of the 2000-2001 Student Handbook)